

CLAIMS

What is claimed is:

- 1 1. An apparatus for decoding data comprising:
 - 2 an array of storage elements having N rows and M columns, wherein an
 - 3 input of each element in each column may receive data from R elements of a
 - 4 previous column and an output of each element in each column may be received
 - 5 by R elements in a next column, and
 - 6 wherein said inputs and outputs are logically interconnected according to
 - 7 an encoder polynomial for an error correction code.

- 1 2. The apparatus as in claim 1 wherein said encoder polynomial is a
2 Viterbi encoder polynomial.

- 1 3. The apparatus as in claim 1 wherein R=2 for an encoder polynomial
2 rate of 1/2.

- 1 4. The apparatus as in claim 1 wherein R=3 for an encoder polynomial
2 rate of 1/3.

- 1 5. The apparatus as in claim 2 wherein M is equivalent to the depth of a
2 Viterbi trellis.

- 1 6. The apparatus as in claim 5 wherein M = 64.

1 7. The apparatus as in claim 1 further comprising:
2 selection signals for selecting data for each element in each column from
3 said R elements of a previous column, said selection signals generated based on
4 a minimum path metric associated with each storage element.

1 8. The apparatus as in claim 7 wherein N selection signals select data
2 for elements in each of said N rows in said matrix, thereby specifying for all M
3 elements in each row which of said R elements from a previous column to select
4 data, said selections causing data to propagate through said matrix according to
5 said encoder polynomial.

1 9. The apparatus as in claim 8 wherein said selection signals are
2 generated by add-compare-select units selecting the lowest of R potential path
3 metrics.

1 10. The apparatus as in claim 9 wherein $R = 2$ for a code rate of $1/2$.

1 11. The apparatus as in claim 1 further comprising minimization logic to
2 identify a storage element in a final column of said matrix from which to select
3 data.

1 12. The apparatus as in claim 11 wherein said minimization logic
2 identifies said storage element based on said storage element having a
3 minimum path metric associated therewith.

1 13. The apparatus as in claim 12 wherein said minimum path metric is
2 determined based on a minimum of N accumulator values of add-compare-select
3 units associated with each of said N rows.

1 14. A forward-tracing array for decoding data comprising:
2 a matrix of storage elements having N rows and M columns;
3 connection logic for interconnecting said storage elements across
4 columns according to an encoder polynomial such that each element may
5 receive data from R storage elements in a previous column; and
6 selection logic for selecting storage elements from said R storage
7 elements from which to read data based on a calculated path metric associated
8 with each of said R storage elements.

1 15. The apparatus as in claim 14 wherein said encoder polynomial is a
2 Viterbi encoder polynomial.

1 16. The apparatus as in claim 14 wherein R=2 for an encoder polynomial
2 rate of 1/2.

1 17. The apparatus as in claim 14 wherein R=3 for an encoder polynomial
2 rate of 1/3.

1 18. The apparatus as in claim 15 wherein M is equivalent to the depth of
2 a Viterbi trellis.

1 19. The apparatus as in claim 18 wherein M = 64.

1 20. The apparatus as in claim 14 wherein said selection logic further
2 comprises:

3 N selection signals to select data for M elements in each of said N rows in
4 said matrix, thereby specifying for all M elements in each row which of said R
5 elements from a previous column to select data, said selections causing data to
6 propagate through said matrix according to said encoder polynomial.

1 21. The apparatus as in claim 20 wherein storage elements in a first
2 column of said matrix are loaded with constant values and said selection signals
3 select data for M-1 elements in each of said N rows.

1 22. The apparatus as in claim 21 wherein said selection signals are
2 generated by add-compare-select units selecting the lowest of R potential path
3 metrics.

1 23. The apparatus as in claim 22 wherein R = 2 for a code rate of 1/2.

1 24. The apparatus as in claim 14 further comprising minimization logic to
2 identify a storage element in a final column of said matrix from which to select
3 data.

1 25. The apparatus as in claim 24 wherein said minimization logic
2 identifies said storage element based on said storage element having a
3 minimum path metric associated therewith.

1 26. The apparatus as in claim 25 wherein said minimum path metric is
2 determined based on a minimum of N accumulator values of add-compare-select
3 units associated with each of said N rows.

1 27. A machine-readable medium having code stored thereon which
2 defines an integrated circuit (IC), said IC comprising:
3 an array of storage elements having N rows and M columns, wherein an
4 input of each element in each column may receive data from R elements of a
5 previous column and an output of each element in each column may be received
6 by R elements in a next column, and
7 wherein said inputs and outputs are logically interconnected according to
8 an encoder polynomial for an error correction code.

1 28. The machine-readable medium as in claim 27 wherein said encoder
2 polynomial is a Viterbi encoder polynomial.

1 29. The machine-readable medium as in claim 27 wherein R=2 for an
2 encoder polynomial rate of 1/2.

1 30. The machine-readable medium as in claim 27 wherein R=3 for an
2 encoder polynomial rate of 1/3.

1 31. The machine-readable medium as in claim 28 wherein M is equivalent
2 to the depth of a Viterbi trellis.

1 32. The machine-readable medium as in claim 31 wherein M = 64.

1 33. The machine-readable medium as in claim 27 further comprising:
2 selection signals for selecting data for each element in each column from
3 said R elements of a previous column, said selection signals generated based on
4 a minimum path metric associated with each storage element.

1 34. The machine-readable medium as in claim 33 wherein N selection
2 signals select data for elements in each of said N rows in said matrix, thereby
3 specifying for all M elements in each row which of said R elements from a
4 previous column to select data, said selections causing data to propagate
5 through said matrix according to said encoder polynomial.

1 35. The machine-readable medium as in claim 34 wherein said selection
2 signals are generated by add-compare-select units selecting the lowest of R
3 potential path metrics.

1 36. The machine-readable medium as in claim 35 wherein R = 2 for a
2 code rate of 1/2.

1 37. The machine-readable medium as in claim 27 further comprising
2 minimization logic to identify a storage element in a final column of said matrix
3 from which to select data.

1 38. The machine-readable medium as in claim 37 wherein said
2 minimization logic identifies said storage element based on said storage element
3 having a minimum path metric associated therewith.

1 39. The machine-readable medium as in claim 12 wherein said minimum
2 path metric is determined based on a minimum of N accumulator values of add-
3 compare-select units associated with each of said N rows.